KSC-STD-P-0001B
April 27, 1992
Supersedes
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October 17, 1988

PREPARATION OF EQUIPMENT OR SYSTEM PROCUREMENT/PERFORMANCE SPECIFICATIONS, STANDARD FOR

ENGINEERING DEVELOPMENT DIRECTORATE

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NASA

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PREPARATION OF EQUIPMENT OR SYSTEM PROCUREMENT/PERFORMANCE SPECIFICATIONS, STANDARD FOR

Approved:

Walter T. Murphy
Director of Engineering Development

JOHN F. KENNEDY SPACE CENTER, NASA

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LIST OF ILLUSTRATIONS

ABBREVIATIONS AND ACRONYMS

DE	Engineering Development Directorate
e.g.	for example
FMEA	Failure Mode and Effect Analysis
GFE	Government-furnished equipment
GFI	Government-furnished information
GFL	Government-furnished labor
GFS	Government-furnished software
GP	general publication (KSC)
i.e.	that is
JSC	Lyndon B. Johnson Space Center
KSC	John F. Kennedy Space Center
LRU	line replaceable unit
MIL	military
MSFC	George C. Marshall Space Flight Center
MTBF	mean time between failure
MTTR	mean time to repair
NASA	National Aeronautics and Space Administration
NHB	NASA handbook
O&M	operation and maintenance
STD	standard

PREPARATION OF EQUIPMENT OR SYSTEM PROCUREMENT/PERFORMANCE SPECIFICATIONS, STANDARD FOR

1. SCOPE

This standard establishes the format and contents of system or equipment procurement/performance specification drawings prepared by or for the John F. Kennedy Space Center (KSC). This standard applies to the preparation of new equipment procurement/performance specifications for which KSC has responsibility. An equipment procurement/performance specification will be prepared when industry, Federal, military, or NASA specifications for the item to be acquired do not exist or when existing industry, military, Federal, or NASA specifications do not adequately define, control, or document the equipment.

2. APPLICABLE DOCUMENTS

The following documents form a part of this document to the extent specified herein. When this document is used for procurement, including solicitations, or is added to an existing contract, the specific revision levels, amendments, and approval dates of said documents shall be specified in an attachment to the Solicitation/State of Work/Contract.

2.1 Governmental.

2.1.1 Standards.

John F. Kennedy Space Center (KSC), NASA

KSC-STD-141	Load Test, Identification and Data Marking, Standard for
KSC-STD-E-0015	Marking of Ground Support Equipment, Standard for

Military

MIL-STD-109	Quality Assurance Terms and Definitions
MIL-STD-1472	Human Engineering Design Criteria for Military Systems, Equipment, and Facilities

2.1.2 Drawings.

John F. Kennedy Space Center (KSC), NASA

75M50393	Identification Plate, KSC GSE

2.1.3 Publications.

National Aeronautics and Space Administration (NASA)

NHB 6000.1	Requirements for Packaging, Handling, and Transportation for Aeronautical and Space Systems, Equipment, and Associated Components

John F. Kennedy Space Center (KSC), NASA

GP-435	Engineering Drawing Practices
KSC-DE-512-SM	Guide for Design Engineering of Ground Support Equipment and Facilities for Use at Kennedy Space Center
KSC-DF-107	DE Technical Documentation Style Guide

(Copies of specifications, standards, drawings, and publications required by suppliers in connection with specified procurement functions should be obtained from the procuring activity or as directed by the Contracting Officer.)

3. REQUIREMENTS

3.1 General Requirements. - System or equipment procurement/performance specifications shall contain all pertinent information required to adequately define the system, equipment, or hardware. Minimum acceptance standards or characteristics that apply to the function, the performance required, and design requirements for maintainability, safety, reliability, and quality assurance shall be stated. Whenever practicable, requirements shall be stated in terms of functions to be performed or performance to be required. Market research shall be utilized to the extent practicable and specifications shall state requirements in such a manner as to promote full and open competition. Restrictive provisions or conditions shall be included only to the extent necessary to satisfy the minimum needs of KSC or as authorized by law. The applicable requirements of KSC-DE-512-SM shall be specified in the appropriate paragraph of the specification. The specification shall use the applicable paragraphs of the sample specification outline shown in figure 1.

1. Scope
2. Applicable Documents
3. Requirements
   - 3.1 Definition
   - 3.2 Characteristics
     - 3.2.1 Performance Characteristics
     - 3.2.2 Physical Characteristics
     - 3.2.3 Reliability
     - 3.2.4 Maintainability
     - 3.2.5 Environmental Conditions
     - 3.2.6 Transportability
   - 3.3 Design and Construction
     - 3.3.1 Materials, Processes, and Parts
     - 3.3.2 Electromagnetic Interference
     - 3.3.3 Name Plates and Product Marking
     - 3.3.4 Workmanship
     - 3.3.5 Interchangeability
     - 3.3.6 Safety
     - 3.3.7 Human Engineering
     - 3.3.8 Security
     - 3.3.9 Government Furnished Property
   - 3.4 Documentation
   - 3.5 Logistics
   - 3.6 Personnel and Training
   - 3.7 Major Component Characteristics
   - 3.8 Precedence
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   - 3.10 Samples
4. Quality Assurance Provisions
   - 4.1 Responsibility for Inspection
   - 4.2 Special Tests and Inspections
   - 4.3 Quality Conformance Inspection
5. Preparation for Delivery
6. Notes

Appendix

Figure 1. Sample Specification Outline

Whenever available, industry specifications shall be used in defining new equipment. When an appropriate industry specification does not exist, Federal specifications followed by military and then NASA specifications shall be used.

Specification drawings shall be prepared on A-size drawing format (KSC Form 21-2C for the cover and KSC Form 21-2D for continuation sheets) and shall be identified by a NASA drawing number.

3.2 Style, Format, and Detailed Requirements.

3.2.1 Writing Requirements. - The detailed guidelines for writing, format, layout, style, and numbering of sections, paragraphs, pages, figures, and tables shall be in accordance with KSC-DF-107, section IV.

3.3.2 Front Matter. - A system or equipment performance/procurement specification shall contain the following front matter in the order specified.

3.3.2.1 Cover. - The cover for a system or equipment specification shall be prepared on KSC Form 21-2 and shall contain appropriate information as shown in figure 2. The cover shall be SHEET 1 of X (the total number of sheets in the document).

3.3.2.2 Table of Contents. - Any document 10 pages or longer shall have a table of contents. It shall immediately follow the cover page. Figure 3 shows an example of the table of contents.

3.3.2.3 List of Illustrations. - If a specification contains more than five illustrations, it shall have a list of illustrations. This page follows the table of contents. It shall include the figure number, the title, and the sheet number of each illustration as shown in figure 4.

3.3.2.4 List of Tables. - If a specification contains more than five tables, it shall have a list of tables. This page follows the list of illustrations or can be placed on the same page with the list of illustrations if both lists are short (figure 4).

3.3.2.5 Abbreviations and Acronyms. - A list of all abbreviations and acronyms shall be included if there are more than 15 used in the text, figures, tables, and appendixes. This page shall follow the list of tables. An example list of abbreviations and acronyms is shown in figure 5.

3.3.3 Body of Text. - All specifications shall have the following six sections.

1. Scope

2. Applicable Documents

3. Requirements

4. Quality Assurance Provisions

5. Preparation for Delivery

6. Notes

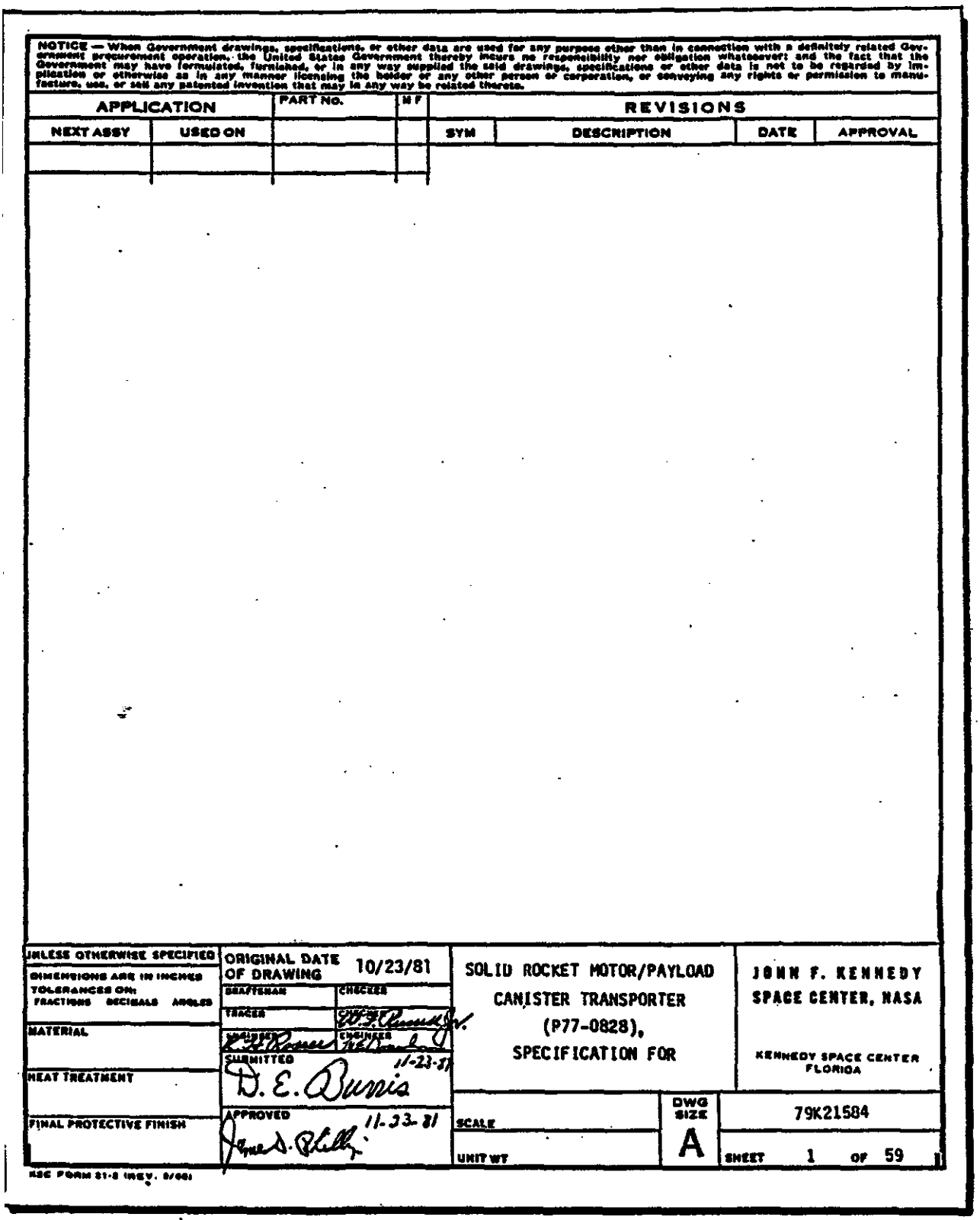
An appendix may be included as an integral part of the system or equipment specification where required.

3.3.3.1 Scope. - Section 1 shall be a statement of the scope and shall consist of a clear, concise summary of the subject matter of the specification, which may include as appropriate information about the use of the equipment. (Additional specific detailed applications may be included in the notes section of the specification under "Intended Use.") This brief statement shall be sufficiently complete and comprehensive to generally describe the item covered by the specification in terms easily interpreted by manufacturers, contractors, suppliers, or others familiar with the terminology and trade practices. As applicable, reference may be made to information contained in section 6, Notes, of the specification.

3.3.3.2 Applicable Documents. - All documents referenced in all sections and appendixes of a specification shall be listed in section 2, Applicable Documents. No document should be referenced in this section without a direct reference in the text. References shall be confined to documents currently available at the time of issuance of the current revision of the specification. Figures bound integrally with the specification shall not be listed in section 2.

The following paragraph shall be used as written:

> "The following documents form a part of this document to the extent specified herein. When this document is used for procurement, including solicitations, or is added to an existing contract, the specific revision levels, amendments, and approval dates of said documents shall be specified in an attachment to the Solicitation/Statement of Work/ Contract."
>
> Federal and military specifications (as well as Government design activity specifications), standards, drawings, and other Government publications may be referenced in the specification.



NOTICE — When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

APPLICATION		PART NO.	M F	REVISIONS			
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UNLESS OTHERWISE SPECIFIED
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FINAL PROTECTIVE FINISH

ORIGINAL DATE OF DRAWING 10/23/81

DRAFTSMAN | CHECKER

TRACER | D. E. Dennis Jr.

WELDER | ENGINEER

SUBMITTED 11-23-81
D. E. Dennis

APPROVED 11-23-81

SOLID ROCKET MOTOR/PAYLOAD CANISTER TRANSPORTER (P77-0828), SPECIFICATION FOR

JOHN F. KENNEDY SPACE CENTER, NASA
KENNEDY SPACE CENTER FLORIDA

SCALE

DWG SIZE A

79K21584

UNIT WT

SHEET 1 OF 59

KSC FORM 21-8 (REV. 8/68)

Figure 2. Example of an Equipment Specification Cover Sheet

CONTINUATION SHEET

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL

TABLE OF CONTENTS

CODE IDENT NO	DWG SIZE	79K08099
22264	A	SHEET 2

Figure 3. Example of a Table of Contents

CONTINUATION SHEET

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL

LIST OF ILLUSTRATIONS

LIST OF TABLES

CODE IDENT NO	DWG SIZE	79K20408
	A	SHEET 6

Figure 4. Example of a List of Illustrations and List of Tables

CONTINUATION SHEET

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL

ABBREVIATIONS AND ACRONYMS

ANA	Air Force - Navy Aeronautical
ANSI	American National Standards Institute
EAS	emergency air supply
ECS	environmental control system
ECU	environmental control unit
F	Fahrenheit
ft	feet
G	gravitational force
Hz	frequency, in cycles per second
kHz	kilohertz
KSC	John F. Kennedy Space Center
lpm	liters per minute
MIL	military
MMH	monomethyl hydrazine
NASA	National Aeronautics and Space Administration
NFPA	National Fire Protection Association
NHB	NASA handbook
NIC	not in contract
N_2H_4	hydrazine
N_2O_4	nitrogen tetroxide
psi	pounds per square inch
psia	pounds per square inch absolute
psig	pounds per square inch gage
rh	relative humidity
scfm	standard cubic feet per minute
STD	standard
typ	typical
UDMH	unsymmetrical dimethyl hydrazine

CODE IDENT NO	DWG SIZE	79K20408
22264	A	SHEET 7

IC FORM 21-48 (REV. 2/78)

Figure 5. Example of an Abbreviations and Acronyms List

Reference may be made in the specification to non-Governmental specifications, standards, and publications prepared and used by commercial organizations, technical societies, and other non-Governmental agencies when such documents are accepted by the using Governmental agency. Care shall be taken in referencing non-Governmental publications so as to ensure the availability of copies.

Referenced documents shall be listed in the following order:

2.1 Governmental.

2.1.1 Specifications.

National Aeronautics and Space Administration (NASA)
John F. Kennedy Space Center (KSC), NASA
Lyndon B. Johnson Space Center (JSC), NASA
George C. Marshall Space Flight Center (MSFC), NASA
Federal
Military

2.1.2 Standards. The same order as 2.1.1.

2.1.3 Drawings. The same order as 2.1.1.

2.1.4 Procedures. The same order as 2.1.1.

2.1.5 Publications. The same order as 2.1.1.

2.1.6 Other Documents. The same order as 2.1.1.

The following paragraph shall be used as written:

"(Copies of specifications, standards, drawings, and publications required by suppliers in connection with specified procurement functions should be obtained from the procuring activity or as directed by the Contracting Officer.)"

2.2 Non-Governmental.

Include all non-Governmental publications (in alphabetical order) and list the name of each publication and the address where copies may be obtained. For example:

Manufacturers Standardization Society (MSS)

MSS-SP-58	Pipe Hangers and Supports - Materials and Design

(Application for copies should be addressed to the Manufacturers Standardization Society, 1815 North Fort Myers Drive, Suite 913, Arlington, VA 22209).

3.3.3.3 Requirements. - The essential requirements and descriptions that apply to function, performance, design, reliability, etc., of the equipment or system covered by the specification shall be stated in section 3. These requirements and descriptions shall define, as applicable, the character or quality of the design, construction, performance, reliability, maintainability, transportability, product characteristics, and physical requirements, dimensions, weight, product marking, workmanship, etc. This section is intended to indicate, as definitely as practicable, the minimum requirements the system must meet to be acceptable. The requirements section shall be written so compliance with all requirements ensures the suitability of the system equipment for its intended purpose, and noncompliance with any requirements will indicate unsuitability for the intended purpose. Only those requirements that are necessary and practicably attainable shall be specified.

In general, each requirement shall be covered in a separate paragraph. The detailed requirements shall be contained in appropriate subparagraphs. Where it is necessary to include additional data, descriptive and appropriate headings shall be used and assigned in logical order. All requirements necessary to ensure delivery of an acceptable end product shall be included.

The requirements specified herein may be tailored to meet specific system needs. In the event a paragraph or subparagraph (as shown in figure 1) has been deleted, a statement to that effect shall be added directly following the heading of such a paragraph. If a paragraph and all its subparagraphs are deleted, only the highest level paragraph heading needs to be included. Section 3 shall include the following paragraphs, as applicable.

3.3.3.3.1 Definition. - A definition of the system or equipment shall be provided in this paragraph in the form of a brief description and shall identify major physical parts, functional areas, and functional and physical interfaces; and shall include system logic, block or schematic diagrams, and pertinent operational, organizational, and logistic considerations and concepts.

3.3.3.3.2 Characteristics. - The characteristics of the system or equipment paragraph shall specify all required performance characteristics, physical characteristics, and requirements for reliability, maintainability, environmental considerations, and, as appropriate, relative priority of design disciplines or characteristics.

3.3.3.3.2.1 Performance Characteristics. - The performance characteristics paragraph shall include general and detailed requirements for all performance requirements (i.e., what is expected of the system or equipment). Where applicable, a brief description shall identify the state of the system or equipment (e.g., idle or ready), the mode of operation, and the capability in the various states or modes. Requirements for interfaces with other existing systems or facilities shall be identified and future system/facility compatibility shall be addressed. The purpose of each interface shall be described and, when possible, each interface shall be specified in detailed, quantitative terms (e.g., dimensions, loads, tolerances, function, voltage, pin wire gage, pressures, and flow rates).

3.3.3.3.2.2 Physical Characteristics. - The physical characteristics paragraph shall set forth physical requirements (e.g., weight and dimensional limits, etc.) that are necessary to ensure physical compatibility with other elements and are not determined by other design and construction features or referenced drawings. Physical characteristics shall also include considerations such as transportation and storage requirements, security criteria, durability factors (e.g., limited life and useful life) health and safety criteria, control requirements, and protective coating and color characteristics.

3.3.3.3.2.3 Reliability. - The reliability requirements paragraph shall be stated in quantitative terms [e.g., mean time between failures (MTBF)] that define the conditions under which the requirements are to be met. Initially, reliability may be stated as a goal and a lower minimum acceptable requirement. This paragraph may include a reliability apportionment model to support appointment of reliability values assigned to major components for their share in achieving the desired overall system reliability.

3.3.3.3.2.4 Maintainability. - Numerical maintainability requirements shall be specified in this paragraph in such terms as mean time to repair (MTTR) or maintenance manhours per operational hour, if required. Qualitative requirements for accessibility, modular construction, test points, and other design characteristics shall be specified as required in accordance with KSC-DE-512-SM. Typical examples of maintainability requirements are maintenance complexity (e.g., number of people and skill levels), time (e.g., mean and maximum downtime, turnaround time, and mean time between maintenance actions), and rate (e.g., frequency of preventive maintenance, manhours per overhaul, and maintenance costs per operating hour).

3.3.3.3.2.5 Environmental Conditions. - Environments the system or equipment is expected to experience in shipment, storage, service, and use shall be specified in this paragraph. Where applicable, it shall be specified whether the equipment will be required to meet or be protected against specified environmental conditions. Subparagraphs shall be included as necessary to cover environmental conditions such as climate, shock, vibration, noise, and hazardous gases.

3.3.3.3.2.6 Transportability. - Any special requirements for transportability and materials handling shall be specified in this paragraph. Any system elements that, due to operational or functional characteristics, will be unsuitable for normal transportation methods shall be identified.

3.3.3.3.3 Design and Construction. - Minimum or essential design and construction requirements that are not controlled by performance characteristics, interface requirements, or referenced documents shall be specified in this paragraph. Design and construction shall include such requirements as appropriate design standards; use or selection of materials, parts and processes; interchangeability; and safety.

3.3.3.3.3.1 Materials, Parts, and Processes. - Requirements for materials, parts, and processes to be used in the system or equipment shall be specified in this paragraph, except where it is more practicable to include the information in other paragraphs. Requirements of a general nature shall be stated first followed by specific requirements. Definitive documents shall be referenced for materials when such documents cover materials of the required quality.

3.3.3.3.3.1.1 Toxic Products and Formulations. - Specifications requiring or permitting toxic products and formulations in the system or equipment or toxic products and formulations generated by the system or equipment shall be specified in this paragraph. These specifications shall require compliance with the applicable regulations promulgated by the appropriate Federal or State regulatory agency governing such products and formulations.

3.3.3.3.3.1.2 Parts. - Standard and commercial parts or equipment shall be specified in this paragraph whenever possible, provided the hardware conforms to the requirements and is used in a manner consistent with the design intent. Parts that are not commercially available or that are considered proprietary shall be clearly identified as such.

3.3.3.3.3.2 Electromagnetic Interference. - Where applicable, requirements pertaining to electromagnetic radiation shall be specified in this paragraph in terms of the environment the system or equipment must accept and the environment it generates.

3.3.3.3.3.3 Nameplates or Product Markings. - All requirements pertaining to nameplates or product markings shall be specified in this paragraph, except where it is more practicable to include the information in other paragraphs, and applicable specification drawings (e.g., 75M50393) or standards (e.g., KSC-STD-E-0015 or KSC-STD-141) shall be referenced. Such identification is necessary for the maintenance of inventory stocks, replacements, and repair parts. Nameplates or markings shall be required only if identification of a product is necessary for delivery or after delivery.

3.3.3.3.3.4 Workmanship. - Where applicable, reference to workmanship shall be stated in this paragraph and shall include the necessary requirements relative to the standard of workmanship desired, uniformity, freedom from defects, and general appearance of the finished product. The requirements shall be stated in such a way as to indicate, as definitively as practical, the standard of workmanship quality the product must meet to be acceptable. The requirements shall be so stated as to provide a logical basis for rejection in those cases where workmanship is such that the system or equipment is unsuitable for the purpose intended. Generally, no definite tests other than visual examination of workmanship will be applicable to the requirements of this paragraph.

3.3.3.3.3.5 Interchangeability. - The requirements for system equipment or components to be interchangeable or replaceable shall be specified in this paragraph. The purpose of this paragraph is to establish a condition of design and not to define the conditions of interchangeability that are required by the assignment of a part number.

3.3.3.3.3.6 Safety. - Safety requirements to preclude or limit hazards to personnel, equipment, or both shall be specified in this paragraph. To the extent practicable, these requirements shall be imposed by citing established and recognized standards. Safety requirements that are basic to the design of the system, with respect to equipment, characteristics, methods of operation and environmental influences, shall be specified. Limiting safety characteristics unique to the system or equipment due to hazards in assembly, disassembly, test, transport, storage, operation, or maintenance shall be stated when covered by neither standard industrial or service practices nor the system specification. "Fail safe" and emergency operating restrictions shall be included when applicable. These restrictions shall include interlocks and emergency and standby circuits required to either prevent injury or provide for recovery of the hardware in the event of failure.

3.3.3.3.3.7 Human Engineering. - Human engineering requirements for the system or equipment shall be specified in this paragraph, and applicable documents (e.g., MIL-STD-1472) shall be included by reference. Special or unique requirements (e.g., constraints on allocation of functions to personnel and communications and personnel/equipment interactions) shall be specified. Those specified

areas, stations, or equipment that require concentrated human engineering attention due to the sensitivity of the operation or criticality of the task (i.e., those areas where the effects of human error would be particularly serious) should be included.

3.3.3.3.3.8 Security. - Where applicable, requirements for security that are basic to the design of the system or equipment with respect to the operational environment of the system shall be specified in this paragraph. Security requirements shall also specify those steps necessary to prevent the compromise of sensitive information or materials.

3.3.3.3.3.9 Government-Furnished Property. - Where applicable, any Government-furnished equipment (GFE) to be incorporated into the system or equipment design shall be specified in this paragraph. This paragraph shall also specify any Government-furnished information (GFI), Government-furnished software (GFS), or Government-furnished labor (GFL) to be incorporated into the system or equipment. This list shall identify the Government-furnished property by reference to its nomenclature, specification and/or part number, and quantity. The list may also be included as an appendix to the specification or in the contract schedule and referenced in this paragraph.

3.3.3.3.4 Documentation. Where applicable, requirements for documenting the design shall be specified in general terms in this paragraph. Types of documents required for design review and approval, manufacture or procurement, testing, inspection, installation, operation, maintenance and logistic support as appropriate shall be specified.

a. Design Documentation (When Applicable). All drawings, diagrams, schematics, etc., shall comply with the contractor's technical documentation system.

   (1) Drawing Numbers. The Government will furnish the drawing numbers only in those applications in which KSC drawing numbers are required to maintain configuration control.

   (2) Minimum Documentation Data. Minimum design documentation shall consist of drawings, schematics, a basic description of the item, and design calculations. The drawings shall show all the information required to fabricate the equipment from semifinished and finished materials and components.

b. Operation and Maintenance (O&M) Manuals. When required, O&M manuals shall be prepared by the vendor or another Government contractor. Where standard vendor manuals already exist, they shall be provided by the vendor.

c. O&M Data. All information required for the preparation of O&M manuals shall be provided by the vendor. This shall include operating and maintenance instructions, design capacities, system schematics and diagrams, and parts lists that reflect the item name, the true manufacturer's name, the Federal supply code for the manufacturer, the manufacturer's part number, and the contractor's part number (if one is assigned). The spare-parts list shall be coded to show the recommended spare parts and reparable items.

d. Vendor Data. In addition to drawings, vendor data (e.g., catalogue cuts) for each component/line replaceable unit (LRU) and commercially purchased products shall be provided. This data shall include a parts list for each component/LRU and shall contain:

(1) Description: the name of the part and, when necessary, the size, dimensions, material, and tolerances

(2) True manufacturer's name: Federal supply code for the manufacturer

(3) True manufacturer's part number: Government standard part number, if applicable

(4) Repair parts: when repair parts are supplied in the form of kits or as quick-change units, they shall be identified

(5) Quantity: the quantity of each part required

(6) Spare parts: coded to reflect recommended spare parts

3.3.3.3.5 Logistics. - Where applicable, logistic considerations and conditions that apply to the system or equipment shall be specified in this paragraph. Logistic conditions such as maintenance considerations, modes of transportation, supply system requirements, and impact on existing facilities and equipment shall be considered.

3.3.3.3.6 Personnel and Training. - Where applicable, requirements imposed by or limited by personnel or training considerations that must be integrated into the system or equipment design shall be specified in this paragraph. Training considerations shall include existing facilities, equipment, special/emergency procedures, and training simulators as well as the need for additional facilities and equipment. Personnel requirements shall be specified in a positive sense, assuming that the number and skill levels of personnel will be made available. The personnel requirements shall be the basis for contractor design and develop-

ment decisions and the basis for determination of system training and training equipment/facility requirements.

Training requirements shall include the concept of how training will be accomplished, contractor/Government training responsibilities, training equipment requirements, training devices required, and time and locations necessary for an effective training program.

3.3.3.3.7 Major Component Characteristics. - Where necessary, requirements for major components or subordinate elements or the system or equipment shall be specified in this paragraph. Requirements for each selected major component (subordinate element) shall be grouped under a major heading entitled with the name of that component (element) and shall include all of the pertinent types of requirements specified herein for the parent system or equipment. Requirements imposed on the component by the parent system or equipment shall not be repeated. Parent system requirements may be allocated or apportioned to each component or sub-element.

3.3.3.3.8 Precedence. - The order or precedence of requirements (e.g., specifications over drawings, functional requirements over physical requirements, adherence to specified processes over other requirements, etc.) shall be specified in this paragraph. The paragraph shall also require that the contractor notify the contracting agency of each instance of conflicting, or apparently conflicting, requirements.

Alternatively, this paragraph may specify that the requirements of the specification shall take precedence over referenced documents. In system or development specifications, this paragraph shall specify the relative importance of requirements (or goals) to be achieved by the design.

3.3.3.3.9 Qualification. - Where performance qualification of a system or equipment design is required (either on a one-time or a periodic basis) to achieve design approval, proof of producibility, or other reasons, provisions for such qualification testing shall be specified in this paragraph. Requirements shall be included that specify the conditions for testing, time (phase) of testing, number of units to be tested, documentation, and other requirements relating to qualification or requalification.

3.3.3.3.10 Samples. - Samples that are considered essential to supplement or illustrate certain requirements of the specification shall be specified in this paragraph. Use of samples should be kept to a minimum. The use of samples shall be limited to the illustration of qualities and characteristics that cannot be readily described because detailed test procedures or design data are not available, or because certain qualities and characteristics cannot be definitely expressed. Further, the specification should state the specific characteristics and the degree

to which these characteristics are to be observed in the sample. When a sample is to be furnished, it shall be so stated in section 3, and the means of obtaining or viewing the sample shall be specified in section 6.

3.3.3.4 Quality Assurance Provisions. - Section 4 shall reference all the examinations and tests to be performed to ensure that the system or equipment to be developed or offered for acceptance conforms to the requirements in sections 3 and 5 of the specification. The order of presentation of this section shall be as outlined by the requirements as presented in section 3 or shall follow the most logical order of conducting the inspections and tests. The general tests and inspection philosophy shall be described with a statement of responsibility for inspection, classification of examinations and tests, and other information pertinent to the quality assurance provisions as specified in KSC-DE-512-SM. Section 4 shall include the following paragraphs, as applicable.

3.3.3.4.1 Responsibility for Inspection. - The concept of quality assurance places primary responsibility for quality of delivered products, materials, or services on the supplier or contractor. The contractor is also responsible for the inspection/quality of subcontractor products. In system specifications, however, where assembly of the system is at a Government facility, responsibility for inspection will probably be split between the Government and the contractor. Accordingly, the supplier's responsibility for inspection shall be clearly stated in this paragraph and the Government's role, either as a partner or monitor, shall be specified. A typical statement of responsibility is:

> Responsibility for Inspection. Unless otherwise specified in the contract or order, the supplier is responsible for the performance of all inspection requirements specified herein. Except as otherwise specified, the supplier may use his own facilities or any commercial laboratory acceptable to the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

3.3.3.4.2 Special Tests and Inspections. - In this paragraph, all special tests and inspections for acceptance performance qualification, etc., shall be covered under an appropriate heading.

When a tabular form of presentation provides a better understanding of the correlation between tests of section 4 and requirements of section 3 or clarifies the test requirements for acceptance, performance, qualification, etc., a presentation similar to the following shall be made.

	Test Procedure	
Requirement	Acceptance	Periodic Production
3.3.1	4.2.1	4.2.1
3.3.2.1		
3.3.2.2	4.2.2.1	4.2.2.1
3.3.2.3		
3.3.2.4	4.2.2.3	4.2.2.3
3.3.3.1	4.2.3.1	4.2.3.1
3.3.3.2		4.2.3.2
5.2.1		

3.3.3.4.3 Quality Conformance Inspections. - All examinations and tests required to verify that all requirements of sections 3 and 5 have been achieved shall be listed in this paragraph. These examinations and tests shall include:

a. Tests and checks of the performance and reliability requirements

b. A measurement or comparison of specified physical characteristics

c. Verification, with specific criteria, or workmanship

d. Test and inspection methods for ensuring compliance, including environmental conditions for performance

e. Classification of characteristics as critical, major, or minor (in accordance with MIL-STD-109). When required for reference purposes in reporting inspection results, the characteristics can be numbered. When numbered, numbers shall be in accordance with the following:

1 through 99	-	critical characteristics
101 through 199	-	major characteristics
201 through 299	-	minor characteristics

3.3.3.5 Preparation for Delivery. - Section 5 shall include applicable requirements of NHB 6000.1 for preserving, packaging, and packing the system or equipment and marking of packages and containers. If more than one level of preservation and packaging can be used, the higher level shall be required. The specific requirements for materials to be used in preserving, packaging, and packing a product shall also be covered. Requirements can be included by reference to other specifications and applicable standards or by detailed instructions. Section 5 shall include the following paragraphs, as applicable.

3.3.3.5.1 Preservation and Packaging. - The preservation and packaging paragraph shall specify cleaning, drying, and preservation methods that prevent deterioration; appropriate protective wrappings, package cushioning, and interior containers; and package identification markings, not including the shipping container. Where no suitable reference is available, step-by-step procedures for preservation and packaging shall be included.

3.3.3.5.2 Packing. - The requirements for packing shall be specified in this paragraph and shall include the exterior shipping container, the assembly of items or packages therein, blocking, bracing, cushioning, and weatherproofing.

3.3.3.5.3 Marking for Shipment. - Markings essential to safety and to the protection or identification of the equipment shall be specified in this paragraph in detail, including appropriate identification of the product on both packages and shipping containers and all markings necessary for delivery and for storage.

3.3.3.6 Notes. - Section 6 shall contain information of a general or explanatory nature and no requirements shall appear therein.

3.3.3.6.1 Intended Use. - Information relative to the use of the system or equipment covered by the specification shall be included in this paragraph.

3.3.3.6.2 Ordering Data. - Detailed information to be incorporated in invitations for bids, contracts, or other purchasing documents shall be stated in this paragraph. Reference shall be made to all parts of the specification where options may be exercised.

3.3.3.6.3 Use of Government Drawings. - This paragraph shall be included in all specifications with the following statement.

> NOTICE. When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

3.3.3.7 Appendix. - An appendix, identified by the heading APPENDIX, is a section of provisions added at the end of a specification to present supplementary

information that does not logically fit into the text or might otherwise interfere with an orderly plan for the text. An appendix shall be used to append large (multipage) data tables, plans pertinent to the submittal of the equipment, management plans pertinent to the subject of the specification, classified information, or other information or requirements related to the subject equipment. In all cases where an appendix is used, a reference to the appendix shall be included in the body of the specification.

3.4 Changes, Revisions, and Cancellations. - System or equipment performance/procurement specifications that carry an XXKXXXXX number shall be revised or canceled in accordance with requirements specified in GP-435.

4. NOTES

4.1 Intended Use. - This standard is intended to be used in the establishment of uniform engineering practices and methods for the preparation of equipment or system procurement/performance specifications and to ensure the inclusion of essential requirements.

NOTICE. When Government drawing, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

Custodian:

NASA - John F. Kennedy Space Center

Preparing Activity:

John F. Kennedy Space Center
Mechanical Engineering Division
Engineering Development Directorate